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IS 9263-2 (1999): Wrist Watches - Jewels, Part 2: Types and Dimensions [PGD 23: Horology]

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भारतीय मानक

कलाई की घड़ियां — जूवेल

भाग 2 टाइप और आयाम

(पहला पुनरीक्षण)

Indian Standard

WRIST WATCHES — JEWELS

PART 2 TYPES AND DIMENSIONS

(First Revision)

ICS 39.040

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1999 **Price Group 7**

Horology Sectional Committee, LM 23

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Horology Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

This standard was originally published in 1982. This revision is based on further experience gained and other developments in this field.

The main modifications are as follows:

> Few additional sizes of RSH, ROH, CSH and COH types jewels have been included under **4.2.1** and **4.3.1** respectively.

This standard is being issued in two parts. The other standard in this series is :

IS 9263 (Part 1) : 1979 Horological jewels: Part 1 Definition of functional and non-functional jewels

In the preparation of this standard, considerable assistance has been derived from DIN 8261-1972 Jewels for fine machines: V-Jewels issued by DIN Deutsches Institut für Normung.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WRIST WATCHES — JEWELS

PART 2 TYPES AND DIMENSIONS

(First Revision)

1 SCOPE

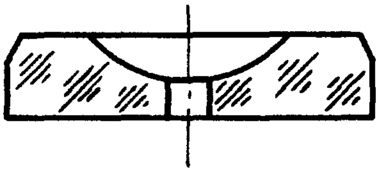
This standard (Part 2) covers the classification, dimensions and general requirements of jewels for bearings used in watches and clocks.

2 CLASSIFICATION AND TYPES OF JEWELS

2.1 Flat Jewel

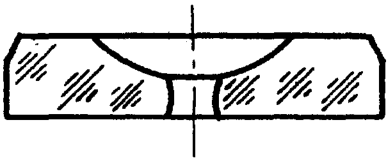
Type Designation

a) With straight hole



FSH

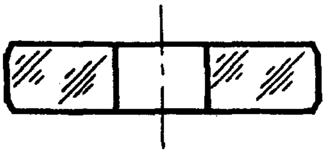
b) With olived hole



FOH

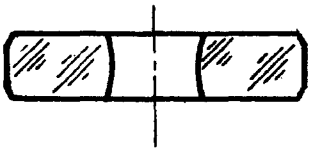
2.2 Ring Jewel

a) With straight hole



RSH

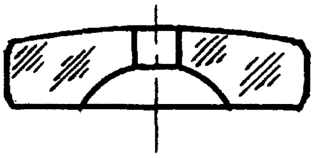
b) With olived hole



ROH

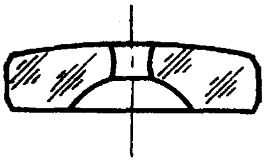
2.3 Convex Jewel

a) With straight hole



CSH

b) With olived hole

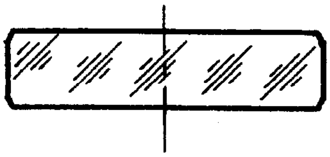


COH

2.4 Cap Jewel

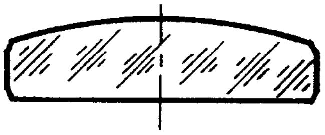
Type Designation

a) Flat type



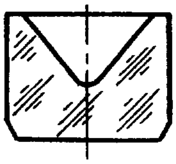
CF

b) Convex type



CC

2.5 V-Type Jewel



V

3 TERMINOLOGY

3.1 Flat Jewel

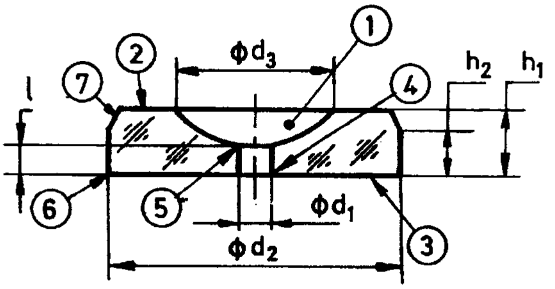


FIG. 1 FLAT JEWEL

3.2 Ring Jewel

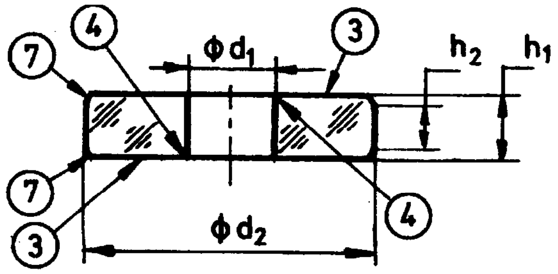


FIG. 2 RING JEWEL

3.3 Convex Jewel

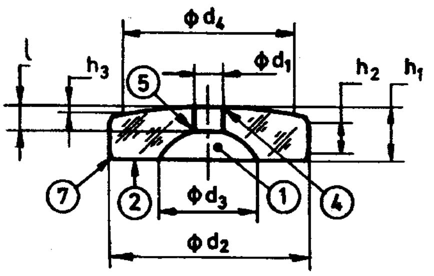


FIG. 3 CONVEX JEWEL

3.4 Cap Jewel

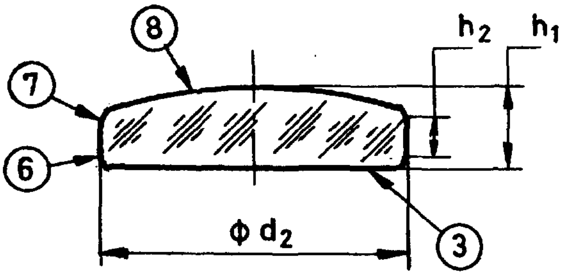


FIG. 4 CAP JEWEL

3.5 V-Type Jewel

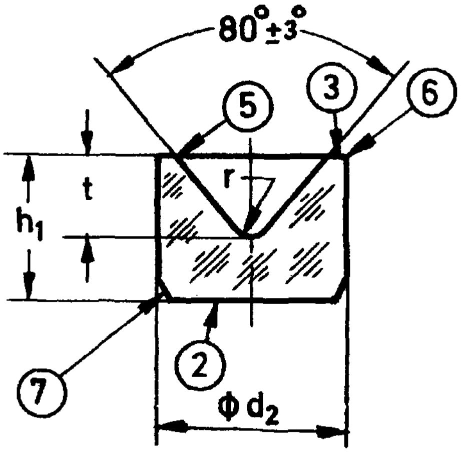


FIG. 5 V-TYPE JEWEL

d_1	Hole diameter	d_3	Recess diameter
d_2	Jewel diameter	d_4	Reference diameter
l	Length of hole	h_1	Thickness
h_2	Height of lateral surface	h_3	Convex surface
t	Depth of V-recess	r	Radius at V-recess
(1)	Recess	(2)	Facet
(3)	Flat surface	(4)	Edge of hole
(5)	Edge at recess	(6)	Outside edge
(7)	Bevel	(8)	Convex

4 DIMENSIONS

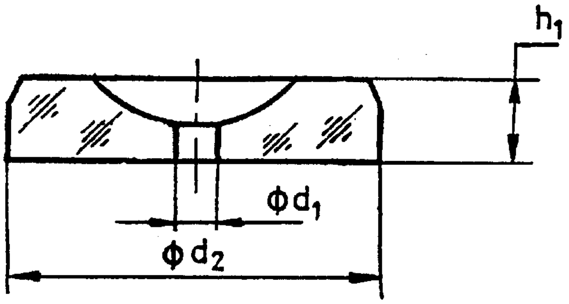
4.1 Flat Jewel — FSH and FOH types (*see* Fig. 1).

4.1.1 Hole Diameter (d_1), Jewel Diameter (d_2) and Thickness (h_1) shall be as given in Table 1.

Table 1 Dimensions of Hole Diameter, Jewel Diameter and Thickness

(*Clause* 4.1.1)

All dimensions in millimetres.



d_1 H5/H6	d_2 K6	h_1 js10							
0.09	0.70	0.18							
	0.80	0.18							
	0.90	0.18							
0.095	0.80		**0.20**						
	0.90		**0.20**						
0.10	0.70	0.18							
	0.80	0.18		0.22					
	0.90	0.18		**0.22**					
	1.00			0.22	0.25				
0.11	0.80	0.18		0.22					
	0.90	0.18		0.22	**0.25**				
	1.00			0.22	0.25				
	1.10				**0.25**	0.30			
	1.20			0.22	0.25				
0.12	0.80	**0.18**		0.22					
	0.90	0.18		0.22					
	1.00		**0.20**	0.22	0.25	0.30			
	1.20				0.25	0.30			
0.13	0.80		**0.20**						
	1.20					**0.30**			
0.14	0.80			0.22					
	0.90			**0.22**	0.25				
	1.00			0.22	0.25				
	1.20				0.25				
0.16	0.60			**0.22**					
	0.80			0.22					
	0.90			0.22	**0.25**				
	1.00				0.25	0.30			
	1.10				**0.25**	0.30			
	1.20				0.25	0.30			
	1.40				0.25	0.30			
	1.60					**0.30**			
0.18	0.80			0.22	0.25				
	0.90			0.22	0.25				
	1.00			0.22	0.25	0.30			
	1.20				0.25	0.30			
	1.40				0.25	0.30			
0.20	0.90			0.22	0.25				
	1.00			0.22	0.25	0.30			
	1.20				0.25	0.30			
	1.40				0.25	0.30			
0.22	0.90			0.22	0.25				
	1.00			0.22	0.25	0.30			
	1.20				0.25	0.30			
	1.40					0.30			

Table 1 (*Concluded*)

All dimensions in millimetres.

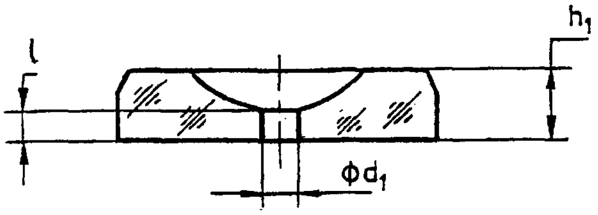
d_1 H5/H6	d_2 K6	h_1 js10							
0.25	0.90			0.22	**0.25**				
	1.00			0.22	0.25	0.30			
	1.20				0.25	0.30			
	1.40					0.30			
0.30	0.90			0.22	0.25	0.30			
	1.00			0.22	0.25	0.30			
	1.20				0.25	0.30			
	1.40								
0.31	1.20						0.35		
0.35	0.90				0.25	0.30			
	1.00				0.25	0.30			
	1.20					0.30	0.35		
	1.40					0.30	0.35		
0.40	0.90				0.25	0.30			
	1.00				0.25	0.30			
	1.20				0.25	0.30	0.35		
	1.40					0.30	0.35		
0.45	0.90				0.25	0.30			
	1.00				0.25	0.30			
	1.20				0.25	0.30	0.35		
	1.40					0.30	0.35		
0.50	1.00				0.25	0.30	0.35		
	1.20				0.25	0.30			
	1.40				0.25	0.30			
0.60	1.00						0.35		
	1.10				**0.25**	0.30	0.35		
	1.20					0.30	0.35		
	1.40					0.30	0.35		
0.70	1.20					0.30	0.35		
	1.40					0.30	0.35		
0.80	1.20			0.22					
	1.40			**0.22**		0.30	0.35	0.40	
	1.60					0.30	0.35	0.40	
0.90	1.40					0.30	0.35	0.40	
	1.60					0.30	0.35	0.40	
	1.80					0.30	0.35	0.40	

NOTE — Values underlined and bold are currently in use.

4.1.2 Hole Diameter (d_1), Thickness (h_1), and Length of Hole (l) shall be as given in Table 2.

Table 2 Flat Jewels — Dimensions of Hole Diameter, Thickness and Length of Hole

All dimensions in millimetres.



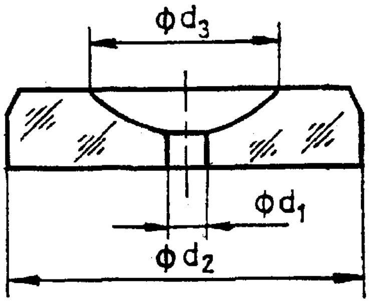
d_1 H5/H6	h_1						
	0.18	0.20	0.22	0.25	0.30	0.35	0.40
							l js10
0.09	0.08						
0.095		**0.09**					
0.10	0.09		**0.09**	0.10			
0.11	0.10		0.10	**0.10**	0.10		
0.12	**0.11**	**0.11**	0.11	0.11	0.12		
0.13		**0.10**			**0.12**		
0.14			**0.12**	0.12			
0.16			**0.14**	**0.14**	**0.14**		
0.18			0.14	0.16	0.18		
0.20			0.16	0.16	0.18		
0.22			0.16	0.16	0.20		
0.25			0.16	**0.16**	0.20		
0.30			0.16	0.16	0.20	0.25	
0.31						0.25	
0.35				0.20	0.20	0.25	
0.40				0.20	0.20	0.25	
0.45				0.20	0.20	0.25	
0.50				0.20	0.20	0.25	
0.60				**0.16**	0.25	0.25	
0.70					0.25	0.25	
0.80			**0.15**		0.25	0.25	0.30
0.90					0.25	0.25	0.30

NOTE — Values underlined and bold are currently in use.

4.1.3 Hole Diameter (d_1), Jewel Diameter (d_2) and Recess Diameter (d_3) shall be as given in Table 3.

Table 3 Flat Jewels — Dimensions of Hole Diameter, Jewel Diameter and Recess Diameter

All dimensions in millimetres.



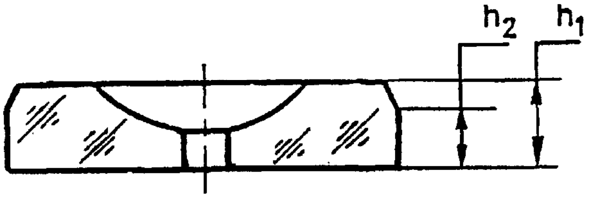
d_1	d_2									
	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.40	1.60	1.80
										d_3 js12
0.09		0.40	0.45	0.50						
0.095			0.45	**0.50**						
0.10		0.40	0.45	**0.50**	0.55					
0.11			0.45	0.50	0.55	**0.60**				
0.12			**0.45**	0.50	0.55		0.70			
0.13			0.45				**0.70**			
0.14			0.45	**0.50**	0.55		0.70			
0.16	**0.35**		0.45	**0.50**	0.55	**0.60**	0.70	0.80	**0.90**	
0.18				0.50	0.55		0.70	0.80		
0.20				0.55	0.60		0.70	0.80		
0.22				0.55	0.60		0.70	0.80		
0.25				**0.55**	0.60		0.70	0.80		
0.30				0.60	0.65		0.75	0.85		
0.31							0.75			
0.35				0.60	0.65		0.75	0.85		
0.40				0.65	0.70		0.80	0.90		
0.45				0.65	0.70		0.80	0.90		
0.50					0.75		0.85	0.95		
0.60					0.70	**0.85**	0.90	1.00		
0.70							0.90	1.00		
0.80							0.50	**1.00**	1.20	
0.90								1.10	1.20	1.40

NOTE — Values underlined and bold are currently in use.

4.1.4 Thickness (h_1) and Height of Lateral Surface (h_2) shall be as given in Table 4.

Table 4 Flat Jewels — Dimensions of Thickness and Lateral Surface Height

All dimensions in millimetres.

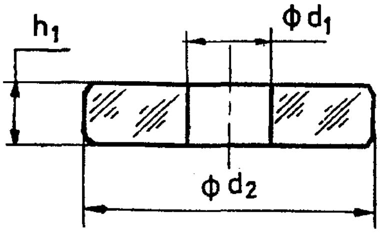


	h_1						
	0.18	0.20	0.22	0.25	0.30	0.35	0.40
h_2	0.10	0.11	0.12 0.13	0.14	0.16	0.20 0.21	0.22

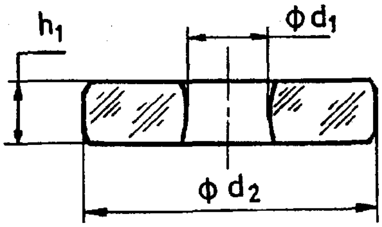
4.2 Ring Jewels RSH and ROH Type

4.2.1 Hole Diameter (d_1), Jewel Diameter (d_2) and Thickness (h_1) shall be as given in Table 5.

Table 5 Ring Jewel — Dimensions of Hole Diameter, Jewel Diameter and Thickness
(*Clause* 4.2.1)
All dimensions in millimetres.



RSH



ROH

d_1 H5/H6	d_2 K6	h_1						
		js9				js10		
0.09	0.90	**0.18**						
0.12	1.00		**0.20**					
	1.10		**0.20**	**0.22**				
0.16	0.80			**0.22**				
	1.00			**0.22**				
0.18	0.90			**0.22**				
	1.40					**0.30**		
0.25	0.80	0.18		0.22	0.25			
	0.90				0.25			
0.30	0.80	0.18		0.22	0.25			
	0.90			0.22	0.25			
	1.00			0.22	0.25	0.30		
	1.20			0.22	0.25	0.30		
0.35	0.90	0.18		0.22	0.25			
	1.00			0.22	0.25	0.30		
	1.20			0.22	0.25	0.30		

Table 5 (*Concluded*)

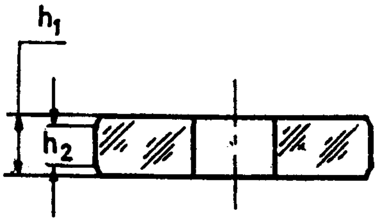
d_1 H5/H6	d_2 K6	h_1						
		js9				js10		
0.40	0.90			0.22	**0.25**	0.30		
	1.00			0.22	0.25	0.30		
	1.20			0.22	0.25	0.30		
0.45	0.90			0.22	0.25	0.30		
	1.00			0.22	0.25	0.30		
	1.20			0.22	0.25	0.30		
0.50	0.90			0.22	0.25	0.30		
	1.00				0.25	0.30		**0.40**
	1.20			**0.22**	0.25	0.30		
0.55	1.00				0.25	0.30	**0.35**	
	1.20				0.25	0.30		
0.60	1.00				0.25	0.30	0.35	
	1.20				0.25	**0.30**		
	1.40				0.25	0.30		
0.70	1.20				0.25	0.30	0.35	
	1.40				0.25	0.30	0.35	
	1.60				0.25	0.30	0.35	
0.80	1.20			**0.22**				
	1.30			**0.22**				
	1.40			**0.22**		0.30	**0.35**	0.40
	1.60					0.30	0.35	0.40
0.90	1.60						0.35	0.40
	1.80						0.35	0.40
1.20	2.00						**0.35**	
1.50	2.30					**0.30**		

NOTE — Values underlined and bold are currently in use.

4.2.2 Thickness (h_1) and Height of Lateral Surface (h_2) shall be as given in Table 6.

Table 6 Ring Jewel — Dimensions of Thickness and Lateral Surface Height

All dimensions in millimetres.



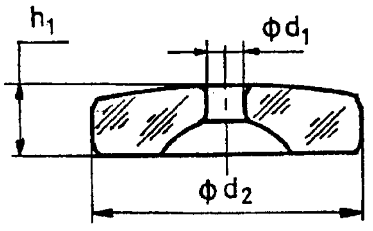
	h_1						
	0.18	0.20	0.22	0.25	0.30	0.35	0.40
h_2	0.09 0.10	0.10	0.10 0.12	0.11 0.14	0.14 0.16 0.18	0.15 0.20 0.25	0.22

4.3 Convex Jewel — shall be of CSH and COH types.

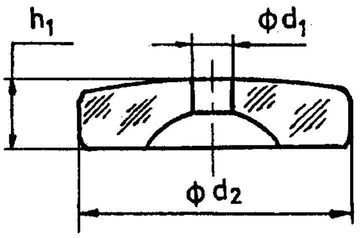
4.3.1 Hole Diameter (d_1), Jewel Diameter (d_2) and Thickness (h_1) shall be as given in Table 7.

Table 7 Convex Jewel — Dimensions of Hole Diameter, Jewel Diameter and Thickness

All dimensions in millimetres.



COH



CSH

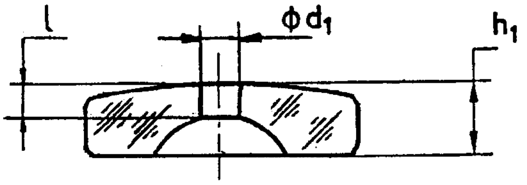
d_1 H5/H6	d_2 J6	h_1							
		js9/js10	±0.01	js9/js10					
0.070	0.7	**0.16**							
0.075	0.7		**0.17**						
0.08	0.7		**0.17**						
	0.8			0.18					
	0.9			0.18	**0.19**				
	1.0			0.18		0.22			
0.085	0.7		**0.17**						
0.09	0.8			0.18					
	0.9			0.18		0.22			
	1.0			0.18		0.22			
0.10	0.8			0.18		0.22			
	0.9			0.18		0.22			
	1.0			0.18		0.22			
0.11	0.8			0.18		0.22			
	0.9			0.18		0.22	0.25		
	1.0			0.18		0.22	0.25		
	1.2			0.18		0.22	0.25		
0.12	0.8			0.18		0.22	0.25		
	0.9			0.18	**0.19**	0.22	0.25		
	1.0			0.18		0.22	0.25		
	1.2			0.18		0.22	0.25		
0.14	0.9					0.22	0.25		
	1.0					0.22	0.25		
	1.2					0.22	0.25		
0.16	0.9				**0.19**	0.22	0.25		
	1.0					0.22	0.25		
	1.2					0.22	0.25		
	1.4						0.25		
0.18	0.9					0.22	0.25		
	1.0					0.22	0.25		
	1.2						0.25		
	1.4						0.25		
0.20	1.0					0.22	0.25		
	1.2						0.25	0.30	0.35
	1.4						0.25	0.30	0.35
0.22	1.0					0.22	0.25	0.30	0.35
	1.2						0.25	0.30	0.35
	1.4						0.25	0.30	0.35
0.25	1.2						0.25	0.30	0.35
	1.4						0.25	0.30	0.35

NOTE — Values underlined and bold are currently in use.

4.3.2 Hole Diameter (d_1), Thickness (h_1) and Hole Length (l) shall be as given in Table 8.

Table 8 Convex Jewel — Dimensions of Hole Diameter, Thickness and Hole Length

All dimensions in millimetres.

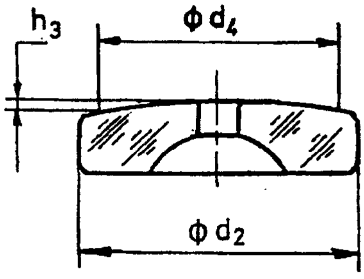


d_1	h_1							
	0.16	0.17	0.18	0.19	0.22	0.25	0.30	0.35
	l js10							
0.07	0.09							
0.075		0.07						
0.08		0.07	0.07	0.12	0.07			
0.085		0.08						
0.09			0.08		0.08			
0.10			0.09		0.09			
0.11			0.10		0.10	0.10		
0.12			0.11	0.12	0.11	0.11		
0.14					0.12	0.12	0.12	
0.16				0.12	0.14	0.14	0.14	
0.18					0.14	0.14	0.16	
0.20					0.16	0.16	0.18	0.18
0.22					0.16	0.16	0.20	0.20
0.25						0.16	0.22	0.22

4.3.3 Jewel Diameter (d_2), Reference Diameter (d_4) and Convex Height (h_3) shall be as given in Table 9.

Table 9 Convex Jewel — Dimensions of Jewel Diameter, Reference Diameter and Convex Height

All dimensions in millimetres.



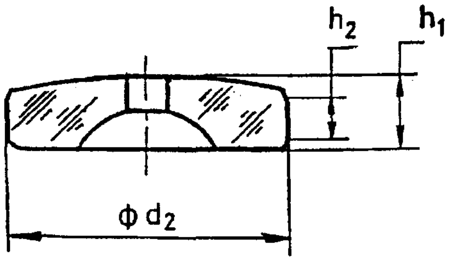
d_2	d_4	h_3 js8
0.7	0.60	0.030
0.8	0.70	0.035
0.9	0.70	0.035
1.0	0.80	0.040
1.2	1.00	0.055
1.4	1.20	0.065

NOTE — Values underlined and bold are currently in use.

4.3.4 Jewel Diameter (d_2), Thickness (h_1) and Height of Lateral Surface (h_2) shall be as given in Table 10.

Table 10 Convex Jewel — Dimensions of Jewel Diameter, Thickness and Height of Lateral Surface

All dimensions in millimetres.



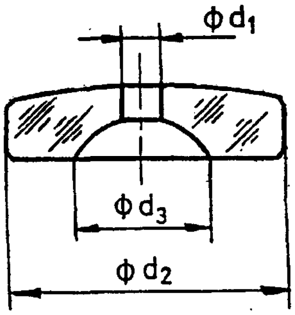
d_2	h_1							
	0.16	0.17	0.18	0.19	0.22	0.25	0.30	0.35
	h_2 js7/js8							
0.7	**0.08**	**0.11**						
0.8			0.08		0.11			
0.9			0.07	**0.08**	0.10	0.10	0.12	
1.0			0.06		0.09	0.11		
1.2					0.08	0.10	0.12	0.14
1.4						0.11	0.12	0.14

NOTE — Values underlined and bold are currently in use.

4.3.5 Hole Diameter (d_1), Jewel Diameter (d_2) and Recess Diameter (d_3) shall be as given in Table 11.

Table 11 Convex Jewel — Dimensions of Hole Diameter, Jewel Diameter and Recess Diameter

All dimensions in millimetres.



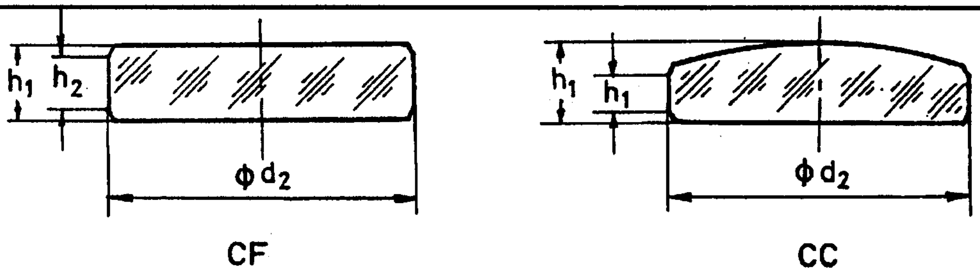
d_1	d_2					
	0.7	0.8	0.9	1.0	1.2	1.4
	d_3 js12					
0.075	0.40					
0.08	0.40	0.45	0.50	0.55		
0.085	0.40					
0.09		0.45	0.50	0.55		
0.10		0.45	0.50	0.55		
0.11		0.45	0.50	0.55		
0.12		0.45	0.50	0.55	0.70	
0.14			0.50	0.55	0.70	
0.16			0.50	0.55	0.70	0.80
0.18			0.50	0.55	0.70	0.80
0.20				0.55	0.70	0.80
0.22					0.70	0.80

4.4 Cap Jewel — CF and CC types (*see* Fig. 4).

4.4.1 Jewel Diameter (d_2), Thickness (h_1) and Height of Lateral Surface (h_2) shall be as given in Table 12.

Table 12 Cap Jewel — Dimensions of Jewel Diameter, Thickness and Height of Lateral Surface

All dimensions in millimetres.



d_2 K6	h_1 js9/js10										
	0.12	0.14	0.16	0.17	0.18	0.19	0.20	0.22	0.25	0.30	0.40
	h_2										
0.80	0.08	0.08	0.08		0.10		0.12	0.12			
0.90		0.08	0.08		0.10			0.12			
1.00		0.08	0.08	0.09	0.10			0.12	0.14		
1.10						0.11	0.12				
1.20		0.08	0.08	**0.09**	0.10			0.12	0.14	0.16	0.22
1.25									0.13		
1.40								0.12	0.14	0.16	0.22
1.60								0.12	0.14	0.16	0.22
1.80										0.16	0.22
2.00										0.16	0.22

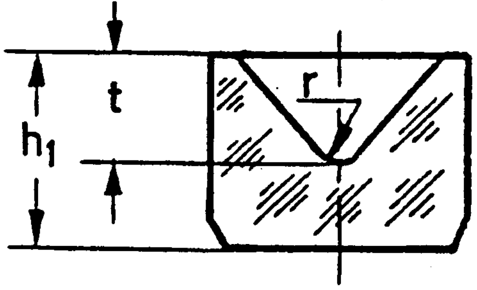
NOTE — Values underlined and bold are currently in use.

4.5 V-Type Jewel — *See* Fig. 5.

4.5.1 Jewel Diameter (d_2), Thickness (h_1), Depth of V-Recess (t) and Radius at V-recess (r) shall be as given in Table 13.

Table 13 V-Type Jewel — Dimensions of Jewel Diameter, Thickness, Depth of V-Recess and Radius at V-Recess

All dimensions in millimetres.



d_2 h8	h_1 0 −0.10	t ±0.05	r				
			±0.005	±0.010	±0.020	±0.025	±0.050
1.0	0.8	0.3			—	—	—
1.2	1.0 1.5	0.4					—
1.6	1.2 1.5	0.6	0.035	0.050	0.080	0.125	0.200
2.0	1.5 2.0	0.75					

5 DESIGNATION

5.1 The jewels shall be designated by the type of jewel, the major dimensions, such as d_1, d_2, h_1, etc, and the number of this standard.

a) Flat jewels/ring jewels/convex jewels with straight/olived hole having hole diameter d_1 - 0.16 mm, jewel diameter d_2 - 0.9 mm and thickness h_1 - 0.22 mm shall be designated as:
FSH 0.16 × 0.9 × 0.22 IS 9263 (Part 2)
FOH 0.16 × 0.9 × 0.22 IS 9263 (Part 2)
ROH 0.16 × 0.9 × 0.22 IS 9263 (Part 2)
CSH 0.16 × 0.9 × 0.22 IS 9263 (Part 2)
COH 0.16 × 0.9 × 0.22 IS 9263 (Part 2)

b) Cap jewels, flat/convex types having diameter $d_2 = 1.2$ mm and thickness $h_1 = 0.25$ mm shall be designated as:
CF 1.2 × 0.25 IS 9263 (Part 2)
CC 1.2 × 0.25 IS 9263 (Part 2)

c) V-jewel having diameter $d_1 = 1.2$ mm, thickness $h_1 = 1.5$ mm and radius at V-recess $r = 0.125$ mm shall be designated as:
V 1.2 × 1.5 × 0.125 IS 9263 (Part 2)

6 MATERIAL

6.1 Horological jewels are made out of natural or synthetic material. Commonly used jewel materials are colourless corrundum and synthetic ruby or sapphire. The general properties of the materials are:

Density		: 3.98
Hardness :	Mohs	: 9
	Knoop	: 1 800 - 2 200 kgf/mm^2
	Vickers	: 2 500 - 3 000 kgf/mm^2
Modulus of elasticity		: 36 000 - 44 000 MPa
Tensile strength		: 260 MPa
Compressive strength		: 2 160 MPa
Melting point		: 2 050°C
Index of refraction		: 1.768 // C
(sodium D-line)		: 1.760 C
Chemical resistance		: Practically inert to all chemical agents, even at high temperatures

7 QUALITY

7.1 Jewels shall be free from visual defects, such as oval hole, broken or chipped off edges at the hole as well as at outside edges, scratches and poor surface finish at the hole and on flat/convex surfaces, cracks, air cavities, discontinuous livecut leaving sharp edge in the hole, etc, when examined using a stereoscopic microscope with a minimum magnification of 16 times under suitable light (Neon light) condition.

7.2 The lateral surface shall have ground finish and the remaining jewel surfaces shall have highly polished surfaces.

7.3 The edges of the hole (4), at recess (5) and outside (6) shall be rounded. The radii shall be 10 μm at (4) and 20 μm at (5) and (6).

7.4 The bevel (7) shall be properly shaped (bevel angle — 25° and radius to merge with the lateral surface — 100 μm).

7.5 The jewels shall be properly cleaned.

7.6 The concentricity of the hole of the jewel with respect to the outer diameter shall be within 3 μm.

8 TREATMENT

Jewels after manufacture, shall be treated suitably to obtain a high degree of oil retention property.

9 MARKING

The label containing each pack shall be marked with the source of manufacture or trade-mark, if any, type of jewels; quantity of jewels; and batch number/year of manufacture.

10 PACKAGING

Jewels shall be wrapped in tissue paper and then packed in a manner which will ensure proper protection and identification. Different types and sizes of jewels shall not be packed in the same packing.

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